is given a high velocity as compared to the air. The angle necessary for the jet of flame to sinter in the bottom will be fixed by the resultant of the air and gas angles and velocities. That is, either the air or the gas may be given a maximum velocity; but any change in air velocity will entail a corresponding change in gas velocity, and *vice versa,* as well as a change in port angles, in order to produce the fixed resultant velocity and angle.

For instance, if the gas-port is lined on the resultant angle, the gas velocity will be maximum and the air velocity a minimum. The desirable condition is a velocity which will make the furnace hot throughout its full length. Frequently the trouble with overheated port blocks at the outgoing end is due to the high velocity of the incoming gases. With a high velocity at the incoming end a portion of the jet is practically shot into the outgoing port.

In most American furnaces, the air-port forms a segment over the gas-port; it is claimed that this construction forms a blanket of cooler air between the jet of flame and the roof. As the entering air is several hundred degrees cooler than the flame itself or the hot products of combustion, it is probable that this blanketing action is largely a matter of the imagination. Cooler gases have a tendency to sink below hotter gases; but any swift-moving jet has a tendency to hang together and will cany a layer of colder gases on top of it; these colder gases will have a tendency to move diagonally to the edges of the jet, while they are absorbing heat. The hottest gases, as soon as they escape from the influence of the jet, lose their velocity and tend to seek the roof of the furnace.

The air pressure available for creating velocity in the port is 3 mm 830 of water (0.15 in water column) due to the stack effect of the checkers and flues; it is not, however, advisable to utilize the full pressure available. In the case of the gas,

(0.166 in of water) are due to the stack effect of the checkers and flues, but in addition there is the pressure created in the producer, which may be varied, amounting to one-half inch to one inch of water (12 to 25 kg per square meter). However, for every unit of pressure expended in creating velocity in the gas-port, a unit of pressure must be available at the outgoing port in order to pull a proportional part of the waste gases through the port. If this is not the case, the quantity of waste gases passing through the gas regenerator will be reduced and the amount of heat available for preheating the gas will be reduced.